

**Progress Report 6-Month
Southeast Coastal Ocean Observing Regional Association (SECOORA)**

November 2005

Reporting Period: 6/1/05 – 11/30/05

Project Title: Southeast Coastal Ocean Observations Regional Association (SECOORA):
Building a Regional Association Framework for the Coastal Ocean Observing System of the
Southeastern United States.

Date Project Initiated: 10/1/03

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1.0 Progress on Regional Association Development

1.1 Significant Activities for Reporting Period:

1.1.1 *Regional Association Governance*

- Steering/Governance Committee continued with development and refinement
SECOORA governance and incorporation. Steering Committee meetings
conducted 6/28/05, 7/19/05, 8/05/05, 9/21/05, 10/14/05.

- Developed Terms of Reference (TOR) to establish initial SECOORA membership for purposes of adopting by-laws and business plan and elected initial SECOORA Board of Directors.
- Developed new draft Governance Plan framework in response to regional stakeholder input for use in Business Plan.
- Continued participation in RA coordination through Ocean US and interactions with other RAs.

1.1.2 *Regional Association Business Planning*

- Continued business planning process including development of an initial draft enterprise architecture framework.
- Conducted SECOORA Business Planning Workshop to obtain detailed input from a full range of stakeholders on business planning issues including operational objectives, resource arrangements, and infrastructure requirements. Stakeholder groups represented included sub-regional system operators, observing technologies industries, value-added industries, marine researchers, natural resource managers, marine educators, port industries, recreational boaters, and many others (Jul 27-28, 2005).

1.1.3 *Stakeholder Engagement Process*

- Co-sponsored and participated in SEACOOS workshop focusing on regional stakeholder partnerships for search & rescue and fisheries management applications (Jul 25-26, 2005).
- Participated with various stakeholder groups in development of user-specific IOOS demonstrations and training activities.
- Conducted presentations and information exchange sessions with stakeholder representatives from various sectors including weather forecasting, fisheries management, marine safety, and private sector entities.
- Developed and distributed IOOS-related informational materials for stakeholders.

1.1.4 *DMAC Process*

- Continued DMAC Pilot Projects funded through SURA-SCOOP initiatives. Projects include development of best practices and standards manuals to capture the DMAC issues that have been addressed through SEACOOS information management planning and implementation.
- Continued participation in leadership and implementation of IOOS Demonstration Project being developed as a testbed for DMAC interoperability.

1.1.5 *Outreach and Education*

- In partnership with SEACOOS funded extension efforts, completed various proceedings, reports, brochures, exhibits, and displays that have been used as outreach tools numerous presentations throughout the region.

- In partnership with SEACOOS and COSEE funded education efforts, completed various products including web sites, posters, and display materials including DVDs for use in classroom and other educational venues.
- In partnership with sub-regional systems including CORMP and CARO-COOPS and the National Weather Service, participated in the development of the “Carolinas Coast” outreach product.
- Developed and distributed education and outreach informational materials.

1.2 Results of the activities.

1.2.1 *Regional Association Governance* – The following documents have been developed by the SECOORA Steering Committee:

- SECOORA Resolution
- SECOORA Terms of Reference (TOR) and current member list
- Draft SECOORA Governance Plan Framework

1.2.2 *Regional Association Business Planning* – Following are relevant products and activities related to the development of the Business Plan:

- Business Planning Workshop Overview
- Concept of Operations Document
- Draft Business Plan Outline
- Enterprise Architecture Introduction

1.2.3 *Stakeholder Engagement Process* – Following are relevant products and activities related to the stakeholder engagement process:

- Marketing & Communication Plan Outline
- Stakeholder Contacts List
- Carolina’s Coast NWS Partnership Project
- Hypoxia Response Plan Project
- SEACOOS Maritime Safety and Offshore Operations Theme White Paper
- SEACOOS Ecosystems/Fisheries Application White Paper
- SEACOOS Directional Waves/Sediment Transport Applications White Paper

1.2.4 *DMAC Process* – Following are relevant products and activities related to the DMAC process:

- SEACOOS Data Management and Visualization Cookbook
- SEACOOS NetCDF Common Data Language Specification v2.0
- Regional DMAC Workshops

1.2.5 *Outreach and Education* – In partnership with SEACOOS and other sub-regional partners, numerous outreach and education initiatives have been completed or are currently underway.

- COSEE SE funds from SEACOOS were used to support SEPORT ocean awareness day event in NC, SC and GA. Several of these occurred in the fall.

- A DVD was produced by Blake Schaffer of NCSU entitled "Boats, Buoys, and Marine Science."
- COSEE Florida presented the 2nd poster in a series entitled "Forming Hurricanes" which was produced in partnership with SEACOOS.
- A new SEACOOS brochure was presented.
- "Carolinas Coast", a partnership between North and South Carolina's National Weather Services and SEACOOS was implemented between June and December of 2005.
- A SEACOOS focused kiosk was placed at Jeanette's pier in coastal NC.
- A poster depicting how fishermen can use SEACOOS.org to gather information on the coastal ocean was developed by UNC.

1.3 Plans for the next year to make progress on preparing the business plan, engaging stakeholders, addressing DMAC and establishing education and outreach activities.

Below are the objectives included in the proposal for the upcoming year of the SECOORA effort. Specific actions for implementing these objectives have been identified in the proposal.

Objective 1. Maintain and augment an active dialogue with representatives of Ocean.US and adjacent Regional Associations through the National Federation of Regional Associations (NFRA) to ensure that SECOORA protocols for governance, information management and delivery, and administration are consistent with those being established at the national and regional levels.

Objective 2. Establish SECOORA as a non-profit corporation through the filing of incorporation papers to the Secretary of State of the state selected; Launch SECOORA as an independent organization; Prepare and submit the requisite materials and evidence to Ocean.US in support of certification and formal recognition of SECOORA as a Regional Association.

Objective 3. Expand and formalize the user engagement process through the establishment of linked subregional Stakeholder Advisory Panels and a regional SECOORA Stakeholder Council.

Objective 4. Define and implement specific strategies for providing user-defined products and applications, marketing data and information products, and evaluating benefits.

Objective 5. Develop a Regional DMAC Plan (compliant with the IOOS DMAC Plan) that establishes data integration standards and common data formats and transport protocols to ensure regional and sub-regional system interoperability.

Objective 6. Initiate an Ecosystem Data Partnership (modeled after the GoMOOS Ocean

Data Partnership Initiative) that will “jump start” the integration of ocean observations with coastal resource management and ecosystem information.

2. Priorities for Observations from Regional Perspective (These priorities continued from 18 month report)

2.1 Identification of top five priorities for developing the National Backbone (observations, DMAC and modeling) for FY06-07 and then 08-12, as in last year’s Ocean.us status and priorities report.

The national backbone priorities identified during the August 2004 Annual Implementation Conference should remain as top priority elements for FY 06-07 short-term funding. These are critical support elements necessary to move forward while, at the same time, planning for long-term, sustained funding for the national backbone and regional components. Those short-term priorities include:

- **Fund Regional Associations and the National Federation of Regional Associations** sufficiently to support the appropriate level of outreach, stakeholder engagement and user needs assessment required to fully articulate the requirements of regional IOOS efforts (minimal annual RA support estimated at \$500K each for 11 regions during the three-year initial planning phase; NFRA annual support estimated at \$500K);
- **Fund Necessary DMAC Activities** at the levels identified in the context of the national DMAC planning/implementation effort and provide modest funding to allow initial integration of extant regional systems and to incorporate results of national DMAC activities at the regional level (this latter item estimated at approximately \$200K/region in FY06); and
- **Provide funding for Initial Regional Pilot Projects** as mechanisms to entrain private sector data users and data product suppliers, identify and address issues of data integration and sharing, provide opportunities to showcase successes, and build regional and national constituencies and develop new technology and tools to support the IOOS enterprise.

Concerning longer-term national backbone planning (FY 08-12), the items below were put forth as placeholders by the SECOORA planning group last August as priority functions of the IOOS national backbone. These elements remain valid priority issues for planning and implementing the IOOS program. Each of these elements is being further explored for prioritization as part of SECOORA’s ongoing business planning process.

1) Integrated Information Management System – This system will address recommendations of the DMAC, facilitate coordination among federal agency and regional IOOS system data providers, and continue identification of standards required for interoperability. This should become part of a national environmental information system linking atmospheric, land, and water observations and providing access to data for model applications and product generation centers that serve information to a variety of users dispersed around the nation and the globe. The system needs to include the

capacity to transmit large data volumes to and from various in situ, airborne, and satellite platforms.

In addition to the real-time component, the national backbone should include a data archive and distribution center where the full range of environmental information is accessible to stakeholders. The intended objective of this function is to improve the connections between, usability of, and access to the present disjointed system of national databases and forecasting and prediction systems. The system also needs to ensure proper science-quality baseline information collected by the various distributed components of the IOOS is preserved. Networking, data formats, and data transport protocols (e.g. OPeNDAP and others) are needed to help improve international networks for data collection and delivery.

2) Ocean Observation Platforms and Sensors – The national backbone planning strategy will integrate existing infrastructure that has been proven to be of value, modify that which is duplicative or less effective, and increase the infrastructure in key areas lacking observations or needing enhancement. National backbone observing and communications infrastructure elements may be best placed where regional assets and capabilities are limiting, such as in deep water and under the influences of large boundary currents and sea states where larger buoys are necessary.

- **Buoys:** Design, implement, and provide for continuity of operations for key moored buoys and drifters/gliders as part an integrated national backbone. While there is a national strategy and coordination, the positioning and maintenance of these assets should be integrated more closely with regional priorities. Current NDBC buoy stations which are sparse and sometimes lacking in array design rationale, should be evaluated in terms of future contributions toward meeting regional goals and priorities. Considerations should be made for future networks such as a suitably spaced shelf break array that could provide boundary conditions for wave models and a national or distributed network of calibration facilities that could assist regions in meeting certain measurement standards in a cost effective manner. (Although the long-term priorities are still being considered in the ongoing planning effort, short-term priorities for buoy enhancements were developed in response to a recent NDBC request. The response to that request is Attachment H.)
- **Remote Sensing:** Design, implement, and provide for continuity of a remote sensing satellite infrastructure that includes a vision for integration of ocean remote sensing with IOOS and with an operational, science quality Earth observing system, planning and deployment for real-time coastal ocean remote sensing, planning and deployment for global ocean observations, planning and deployment of land use remote sensing, and integration of a near real-time data delivery capability with a long-term historical archive. A critical function is to provide high spatial, high frequency, multispectral science-quality data for the coastal zone as well as the globe on a continuing basis.
- **Other Facilities:** Design, implement, and provide for continuity of IOOS-related infrastructure including survey equipment, ship support including the exploitation of Volunteer Observing Ships (VOS), and other facilities such as GOES, ARGOS, and other satellite telemetry support. Maintenance and strategic enhancement of the support

infrastructure should be fully integrated into future planning efforts for the national backbone and regional systems.

3) Modeling - Develop and implement an improved national backbone planning strategy for more effective support and integration of ocean and atmospheric modeling. National backbone observing enhancements are needed in areas such as in deep water and under the influences of large boundary currents and sea states to improve coastal ocean model input. In addition to providing oceanographic data enhancements, mesoscale atmosphere models for all regions of the US with some degree of uniformity are needed for improving regional marine weather forecasts and for providing boundary conditions for ocean state variable forecasts.

Also, national modeling strategies often do not make the most effective use of existing or planned regional resources. Modeling strategies for watershed/estuary, estuary/shelf, and shelf/deep-ocean interactions, HAB forecasts, and hazmat/search and rescue applications could all potentially benefit from recent or ongoing regional modeling efforts. National backbone planning efforts should address better integration of regional modeling efforts into such programs, particularly those managed at the federal levels.

In addition, there is an overwhelming need for improvement in the baseline coastal data and information used to feed many of the modeling products, particularly bathymetry. All stakeholders consistently cite the lack of accurate bathymetric data as a major impediment to significant improvements in model outputs.

4) Ecosystem Observations - Develop and implement a comprehensive national backbone strategy for expanding the utility of ocean observations in ecosystem management applications. This should include full support for national and regional partnerships to expand mid-shelf to near-shore in-water sensing capabilities, test new biological and chemical sensor technologies, develop and enhance biological and chemical oceanographic models, and incorporate ecosystem-related information into the IOOS data management structure. Similarly, this needs to integrate observations inland, at the watershed level. The system needs to incorporate socio-economic data and information, as well as physical and biological data. The backbone should develop specific products that are national in scope but should provide for full integration of regionally-based efforts into the national information infrastructure.

5) Outreach and Education - Initiate and sustain an infrastructure to support IOOS outreach and education initiatives at the regional level. The national infrastructure should supplement regional capabilities for stakeholder outreach and capacity building, K-12, undergraduate, graduate and targeted technical higher education, informal education, and public awareness,. The outreach and education function of the IOOS backbone needs to address science, operations, socio-economic, and cultural training and education requirements of the nation. These initiatives are needed to ensure the utility of the IOOS, provide for long-range sustainability of ocean observations systems, and ensure active stakeholder participation in national and regional planning efforts.

2.2 Identification of top five Regional Ocean Observations priorities observations, DMAC, modeling, stakeholder engagement, and include pilots and research for FY06-07 and then for FY08-12.

The items below are draft regional priorities that were put forth last August as placeholders for OceanUS. The list was provisional pending further coordination and development of the RA.

- 1) Regional Information Management System that is integrated with other RAs, the backbone, ORION, other research time series measurements and user groups.
- 2) Expand and operationalize those aspects of remote sensing that are of sufficient resolution to improve significantly coastal/regional products and models (such as HF Radar).
- 3) Expand near-shore to mid-shelf in-water sensing capabilities throughout the region. Priority additions to existing capabilities include directional wave information, optical properties, and acoustic measurement.
- 4) Improve regional/local models to better identify, understand, and predict ocean conditions including estuarine-shelf interactions, directional surface wave spectra, sediment transport, and sea level changes.
- 5) Technical development and implementation of direct, ship and remote sample-based measurements of complex parameters of biological and chemical importance (fisheries, HABs, viruses, contaminants).

During the last year, SECOORA has worked with SEACOOS to develop a draft implementation plan intended to provide a general framework for future RCOOS development in the region. Although this framework only provides a **starting** point for the RCOOS development portion of the SECOORA business plan, it does identify general priorities that expand significantly on those presented in last year's report. The three main elements of the plan include physical state estimation, biogeochemical and ecological processes, and socio-economic applications. Below are general descriptions of those elements.

1) Physical state estimation

Characterizing and forecasting the circulation of the ocean and atmosphere, and the interaction between them, is a fundamental objective of the RCOOS. This includes the surface gravity waves of the ocean. Well-constrained error estimates for state variables will be necessary for applications to societal issues. To meet the observational requirements, a wide variety of observing platforms are required, along with considerable enhancement of present spatial coverage. Similarly, to date no one model system has been used to represent the full physical system. Instead, a number of models are used that are then coupled, either through simple, one-way linkages or through more sophisticated

two-way couplings. Included in this element are ocean circulation, marine atmosphere, surface waves and optics.

2) Biogeochemical and ecological processes

Building on the initial SEACOOSI effort in fisheries oceanography, information on physical conditions will provide the organizing framework around which RCOOS capabilities to address regional biogeochemical and ecological processes will be developed. This will include *in situ* and remote observations as well as modeling approaches. While there is considerable interest in further development of *in situ* sensors for chemical and biological properties, what is presently available for sustained field deployments is limited. For some sensors that are commercially available (e.g., for nutrients), unit costs and maintenance requirements can limit their application. Satellite remote sensing, and ocean color in particular, can provide information on a number of key biological and optical properties on a regional scale, and how the variability in these properties is coupled to physical processes. Given the challenges for algorithm development and validation in what are often optically complex coastal waters, evaluation of various products for specific applications will be required. Partnerships with other programs will likely be required for regional (and seasonal) remote sensing algorithm development and validation.

3) Socio-economic applications

Recognizing and quantifying the role of humans in the coastal ecosystem has been called for in the report of the U.S. Commission on Ocean Policy. Management agencies have long recognized this need and have considerable information on land use, population distributions, etc. They should be encouraged to make their databases publicly available through regional COOS programs as a first step in filling this information void. The development of the RCOOS is intended to be consistent with addressing the broad socioeconomic areas (thematic issues) described in the IOOS Implementation plan developed by OceanUS. The thematic issues that are initially emphasized will be those identified through the interactions with key user groups (already initiated). It is envisioned that this engagement of users will be coordinated through the Regional Association (SECOORA).

In the context of a ten-year RCOOS build-out to address those elements, priorities are addressed in the following five categories:

- **Geographic Coverage**
- **Observing**
- **Information Management**
- **Modeling**
- **Outreach and Education**

- 1) **Geographic Coverage** – There is a significant gap in observing data along the Northeast and East Central Florida Coast. Given the population density along the eastern Florida coastline and the significant economic and military resources in those areas, it is critical for new observing platforms to fill this gap. It is a top priority need

among all stakeholders and a critical gap to be filled in establishing a fully operational regional system.

2) Observing

- Establish an inventory of the regional observing assets; to ensure that this inventory remains up to date, and is coordinated with the efforts of Federal Affiliates and other sub-regional programs, construct a dynamic, web-accessible database; coordinate with Federal Affiliates to define the maintenance and operations costs for various components of the existing observing system; quantify the “leveraging” contributed by the regional partners.
- Improve the reliability of the existing observations and their delivery to users. Develop circulation descriptions based on existing regional data with applications to S&R and fisheries oceanography. Work with MWG to define where additional observations are needed to support ocean circulation models. Develop Lagrangian capabilities.
- Actively engage fisheries councils to find common interests. Do advance legwork for either: 1) Fisheries Oceanography as an organizing theme or 2) a separate symposium with the Fisheries community. Work with Fisheries community to promote broader use of the existing observations, to identify priorities for additional observations relating to management needs (e.g., where and when additional data are needed; what needs to be measured?), and to assess how these can be efficiently obtained.
- Develop additional information products with existing observations (science-based products, e.g., winds, SST, ocean color products, surface currents, heat flux, etc.).
- Interact with federal agencies on technical issues. Provide test beds for technical evaluations of emerging remote and *in situ* technologies, including observational infrastructure (e.g., deployment packages, power and communications systems) as well as sensors.
- Perform the analyses required to improve the observing system design and to develop products for broader applications.
- Initiate a collaborative regional surface wave program. Coordinate with regional stakeholders, starting with a regional workshop at the Field Research Facility (USACE). Conduct a collaborative field experiment in the domain covered by the WERA system to evaluate *in situ* and remote technologies for estimating the directional wave field.
- *Surface waves pilot project* - The surface wave program is at an early stage. An initial community discussion was held as one of the break-out sessions of the Spring 2004 SEACOOS workshop, and directional wave observational capabilities in SEACOOS have been added in 2004. Establishing the design and best practices for a surface wave program (observations and models) will require both scientific analyses and coordination with other groups. This is an area of interest to several agencies, and interactions will need to be developed through the planning process. In addition to the planned surface wave experiment, interactions with federal agencies and other regional parties has been initiated. A regional

surface wave workshop has been proposed for 2005, and the initial efforts to form a regional "wave group" are being pursued. Various observational technologies will continue to be evaluated and the design for wave "test-beds" will be developed. Priority locations for deployment of surface wave observing assets (e.g., areas where coastal erosion or rip currents are critical issues; observations needed for model validation, etc.) will be assessed in this process.

- *Storm surge/inundation pilot project*- Given the extensive low-lying coastal areas in the Southeast, observations and forecasts of coastal storm surge and storm-related inundation are critical to public safety and economic issues such as risk assessment for coastal development. Thus, it is essential that efforts in this area are effectively coordinated with other regional programs and the potential users of this information are engaged in the development process. Additions of relevant real-time observations (e.g., winds, water level, waves, currents) will need to be coordinated with the data assimilation and model validation needs of the SEACOOS and other regional modeling programs (such as SURA SCOOP). Similarly, the dissemination of information to various user groups (such as State- and County-level Emergency Response personnel) will require engagement through outreach and education and product delivery through the information management system .

3) Information Management

Physical State: Four applications have been identified, and will be addressed in two phases (Phase 1: circulation fields, fisheries oceanography; Phase 2: storm surge, surface waves). Regardless of the process area, specific IM application development will be largely based on event-based products that will be identified in coordination with the other groups. These "events" can be ongoing processes, such as the wind field and sea surface temperature products that have been developed, or may be based on episodic events, such as cold water upwelling or hypoxic events.

Biogeochemical/ecological Processes: Two major areas of activity will relate to the requirement for dealing with additional large volumes of complex heterogeneous data. Processes and protocols will be required to be able to integrate regional observing data, which is largely offshore, with the large assemblage of nearshore and estuarine data that have been collected through other programs (e.g. NERES, EPA). Such nearshore data are typically delayed mode, often lack standards-compliant metadata, and are likely to represent a range of formats and vocabularies. The development of mechanisms to integrate these data can be formidable, but the potential benefits are enormous. Appropriate standards must be identified and agreed upon, and then applied to the appropriate data bases.

Socio-economic applications: The IM supports this component largely through the development of user-targeted products, e.g. storm surge forecasting models. Other contributions include: workforce training and student training and education both through inclusion in IM activities and by developing educational tools; technology transfer, through the development and optimization of computer software

development and application to IOOS activities; contribution to the establishment of a truly operational and reliable IOOS through development of the necessary IM processes and infrastructure; development of an IM system that can include and integrate demographic and economic data.

Additional priority IM activities include: identification of the requirements needed to achieve appropriate redundancy in the IM system, followed by their implementation; determination of the appropriate archiving processes, archive locations, and the infrastructure required, followed by implementation of the resultant plan; establishment, in coordination with appropriate partners (e.g. SURA SCOOP) of the appropriate metadata, data, and protocol standards, followed by their implementation; coordination with other RAs, federal agencies, and relevant national organizations to ensure cross-fertilization of knowledge gained and sharing of IM products.

4) Modeling

Develop skill assessment. The current implementation of the SEACOOS Nowcast Forecast System (NFS) is barotropic, with imposed wind stress and tidal elevations. We have focused to date on tidal and sub-tidal (40 hr) low pass filtered coastal water level skill at selected locations, with extensions to include spatial assessment of the observations as more data become available. We will also quantify the spatial and temporal errors in the NCEP EDAS/ETA wind fields used to drive the NFS.

Implementation of strategies for baroclinic modeling and offshore forcing. In addition to properly imposing the forcings by river discharges and atmospheric heat flux, a primary difficulty in including baroclinic dynamics is the specification of accurate and realistic initial conditions for a particular forecast. One possible method for such initialization is by one-way nesting of regional-scale baroclinic models to basin-scale models. This will require assessing how well the basin-scale models represent the regional mass fields and/or how the regional models respond to the basin-scale products as initial conditions.

Assess the regional modeling approach. The SAB, the EFS/FS and the WFS are characterized by radically different geometries and forcings. Next steps include consideration of how best to link model results of the individual study domains and provide a single integrated description of the circulation in the southeast region. Linking the three domains dynamically is not straightforward. The development of a single domain may be attractive for several reasons and will be considered. Implementation of common model domains would allow for model ensembles and other statistics to be estimated. Thus forecasts would be issued with a probability associated with to them. Additionally, in the event on a model failing to complete, there would be in effect a two model back-up built into the system. The downside is the cost associated with a larger model domain maintained by each group.

Ecosystem models. We plan to study and quantify the transport of larvae of selected species in the southeast domain. This effort considers the model flow fields in relation to the design of Marine Protected Areas (MPAs). Additionally, we anticipate our

modeling studies to consider nutrient-phytoplankton-zooplankton-detritus (NPZD) formulations, which will require close communication with the Observational WG to make use of available data for validation and initialization purposes.

Wave models. Inclusion of (high frequency) wave models may improve estimates of bottom friction and sediment transport. Several approaches are available. One approach is that used by the Army Corps of Engineers wherein a 3rd generation wave model is used (no spectral *a priori* expectations) based on WAM (see <http://frf.usace.army.mil/wis/>). Although the agreement with lab experiments is good, fundamental research questions remain. For example, the Gulf Stream on the waves traveling from the open ocean onto the shelf regions is not well understood. One possibility to be explored is that instead of running a wave modeling system within the RCOOS, to download wave modeling products the same way we are downloading the atmospheric forcing. The RCOOS niche might be to provide a higher resolution wave product with a complementary observing system.

Data assimilation. We will begin to examine the possibility of data assimilation into the RCOOS modeling sub-regions as real-time data (e.g., sea level, ADCP and HF Radar) become routinely available.

Execute an initial SE CODAE. While a few demonstrations have been made with the coupling of global ocean to coastal ocean prediction systems, a broad spectrum of science questions and implementation issues must be addressed to move forward with more capable global and coastal ocean information systems that can be applied to an expanding set of user needs, which will increase the demand for operational oceanography. Both the global and coastal ocean communities recognize that it is now an urgent requirement to begin to design and conduct a Coastal Ocean Data Assimilation Experiment (CODAE) as a series of experiments in a variety of regimes which we intend to help develop.

Ensuring Robustness & Grid Technologies. In a nowcast-forecast operational system, it is beneficial to have a distributed approach to running models, in general, and specifically during instances (e.g., the recent hurricanes) that can result in down-time for one or more modeling sites simultaneously. A consideration is that robustness should be achieved while minimizing the number of runs (and associated costs). One solution is to include a coarse resolution run at more than one site as a backup for failure. The goal (in collaboration with SURA-SCOOP) is that Grid computations and grid technologies will be able to address some of the robustness issues.

Portability of the operational system. The implementation of the present operational system has involved the development of software to acquire and process atmospheric products, prepare the models for execution, and post-process the system outputs. However, once in operational mode and with demonstrated skill, groups that have more experience with operational system requirements might better handle maintenance of these systems. It is thus critical to develop and provide documentation

of this system to facilitate migration of technology to other groups.

5) Outreach and Education

Outreach and Education will continue to work interactively with the other components of this strategy to: Facilitate user interaction in the planning, design and evaluation of system components; Increase public awareness of the uses and benefits of IOOS data and applications; Work with observing system partners to enhance and maintain internal mechanisms for the development of extension and education programs; and provide information, resources, and products for educators to incorporate IOOS data into formal and informal education.

One of the key benefits of the strong southeastern partnership has been the commitment of multiple partners to support regional IOOS Outreach and Education activities. The region is able to build significantly on leveraging Outreach and Education activities supported by SEACOOS, Southeast COSEE (NC, SC, GA), FL COSEE, and the COTS-funded projects in the region including CORMP, CARO-COOPS, and COMPS. These partnerships include active participation by the Sea Grant extension programs in North Carolina, South Carolina, and Florida, and the Marine Extension Program in Georgia. Together under the SECOORA umbrella, these Outreach and Education partnerships will contribute to a wide range of successful projects.